JunYoung Kim

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Education

Hanyang University **Mar. 2020 – Aug. 2022**
Master of Science, Department of Interdisciplinary Robot Engineering Systems *Ansan, Republic of Korea*

- Advisor: *Prof. JeaKweon Han*
- Dissertaion: "A study on the Position Estimation of the 1.3m tall Bipedal Humanoid Robot in a Noisy Environment through Keypoint-based Localization"

Hanyang University **Mar. 2014 – Feb. 2020**
Bachelor of Science, Department of Robotics *Ansan, Republic of Korea*

Research Interests

Research interests both in theoretical analysis and verification using real robotic systems, particularly in **Dynamic Legged Locomotion**, **Whole-Body Control**, **Optimization-based Motion Planning**, and **Visual Perception**.

Research Experience

Research Intern | **Humanoid Robotics Laboratory** **Mar. 2023 – Present**
Korea Institute of Science and Technology (Advisor: Dr. YongHwan Oh) *Seoul, Republic of Korea*

- **Development of a Wheel-legged Humanoid Robot** [slide]
  - Research focuses on developing optimization-based dynamic locomotion methods, aiming to actively find the next foot placement and optimal step timing for a point-foot biped robot.
  - Conducted research on MuJoCo simulations and integrated the developed method into a physical wheel-legged humanoid robot to enhance its mobility.

Visiting Graduate Researcher | **Robotics & Mechanisms Laboratory (RoMeLa)** **Jan. 2022 – Jul. 2022**
University of California, Los Angeles (Advisor: Prof. Dennig Hong) *CA, United States*

- **Development of a Humanoid Robot Localization in Soccer Field** [slide, demo]
  - Developed a vision-based localization system for the humanoid robot platform. Integrated a particle filter with a CNN-based object-detection model to achieve precise localization on the RoboCup soccer field.
  - Verified the proposed algorithm via a Webots simulator and successfully implemented the localization system on the physical humanoid robot, deriving high-precision positioning results.
- **Development of a Cooking Dual Manipulator, "YORI"**
  - Employed a kinematic controller for multijoint robots to achieve motion generation in MuJoCo.

Graduate Researcher | **HERoEHS Laboratory** **Mar. 2020 – Jan. 2022**
Hanyang University (Advisor: Prof. JeaKweon Han) *Ansan, Republic of Korea*

- **Development of a Humanoid Robot, "ALICE ver.3"**
  - Developed a kinematic controller for the upper-body module to generate humanoid body motion.
  - Designed and implemented a sophisticated GUI for the humanoid robot platform, enhancing intuitive interaction and dynamic observational capabilities.
- **Development of a Balloon-drone Platform for Air Kinetic Art** [slide, demo]
  - Conceptualized and integrated an ultra-wideband sensor into a wireless positioning system of a robot.
  - Applied the Madgwick AHRS algorithm with IMU sensors to align global axes across 50 balloon-drone platforms, enabling effective swarm control.
- **Development of Hotel Guidance Humanoid Robots** [article]
  - Developed an obstacle detection algorithm utilizing individual 2D LiDAR for each stationary humanoid robot, effectively sensing the customer and enabling its function as a receptionist in an unmanned hotel.

- **Development of a Cooperative Robot Concept Mobile Platform to Interact in a Congested Environment**
  - Directed operations as the project leader and seamlessly managed software and hardware teams, resulting in the successful creation of a robot owing to an efficient workflow and maximized output.
  - Created a mecanum mobile robot with a whole-body concept responsive to external disturbances.
  - Structurally positioned multiple load cells and implemented filtering to ensure reactive motion in response to disturbance forces.

- **Development of a Service Mobile Robot with Two 6-DOF Dual Arm Manipulators, "ABLE"**
  - Implemented the Cartographer algorithm for 2D SLAM, enabling autonomous operation.
  - Integrated the Speech-to-Text functionality using GoogleCloud API, enabling human-robot interaction.

Undergraduate Researcher **May 2017 – Feb. 2020**
Hanyang University *Ansan, Republic of Korea*

- **Capstone Design**
  - Established a smart factory management system based on image processing with the consideration of a multiprocess environment. Enabled dual mobile robots to work cooperatively on a single task, such as moving objects from one location to another.

- **Development of Handrail Walking Assists for the Elderly** (*Advisor: Prof. MinSung Kang*) [article]
  - Participated in manufacturing a handrail walking assist, which was showcased at COEX.

Conference Publications

[c4] **J. Y. Kim**, M. S. Ahn, J. K. Han. "Enhancing AdultSize Humanoid Localization Accuracy: A Vision-based aMCL Leveraging Object Detection Model and Hungarian Algorithm," *2023 22nd IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, 2023 [preprint]

[c3] H. J. Kim, D. K. Oh, **J. Y. Kim**, M. S. Kang. "Development of a Sensor Module for Proximity Communication and Obstacle Detection of Handrail Mounted Type Walking Assists," *Korean Society for Precision Engineering*, 2018 [dbpia]

[c2] H. J. Kim, H. J. Kim, D. K. Oh, **J. Y. Kim**, H. J. Byun, M. S. Kang. "Learning to Generate Trajectory of Striking Motion for Two-link Robot Arm in Air Hockey," *Korean Society for Precision Engineering*, 2017 [poster]

[c1] H. J. Byun, H. J. Kim, H. J. Kim, **J. Y. Kim**, M. S. Kang. "Suggestion of Feedback Mechanism of a Walking Assistant with Handrail for the Elderly," *Korean Society for Precision Engineering*, 2017 [dbpia]

Awards

RoboCup 2022 Bangkok Humanoid League AdultSize Soccer Competition, **2nd Place** **Jul. 2022**
RoboCup Korea Open 2020 Humanoid AdultSize Soccer, **1st Place** **Aug. 2020**

Teaching Experience

Teaching Assistant | Innovation Center for Engineering Education **Mar. 2020 - Dec. 2021**

- Graded and evaluated the Learning Assessment Exam, determining the eligibility for engineering certification.
- Collected lecture portfolios for courses offered in the respective semesters and compiled Continuous Quality Improvement (CQI) reports.

Volunteer Experience

Student Mentor | Field experiential learning 2019 at the Gangwon Career Education Institute **Jun. 2019 - Aug. 2019**

- Mentored and guided 20 high-school students, fostering an understanding of robotics, and coordinated international field trips to prominent robotics laboratories in Korea and the United States of America.

Education Mentor | Hanyang ERICA Summer School 2019 (HESS2019) **Jul. 2019**

- Educated students on how to use Arduino and design motor controllers. Students successfully applied this knowledge to develop simple robots, including servo-based manipulators and mobile robots.

Extracurricular Activities

Autonomous Driving Class by Hyundai Motor Company, **H-Mobility** **Jan. 2022 - May. 2022**
Former leader of an athletic club, **Clutch** **Mar. 2017 - Feb. 2020**
Member of Robotics club, **HY-MEC** **Mar. 2014 - Feb. 2020**

Certifications

Certificate of Participation in RoboCup 2022 Bangkok **Jul. 2022**
H-Mobility Autonomous Driving Class, Hyundai Motor Company **Jun. 2022**
Certificate of Participation in RoboCup 2021 Worldwide **Jul. 2021**
Accreditation Board for Engineering Education of Korea (ABEEK) Completion **Feb. 2020**

Relevant Skills

Programming Languages: C/C++, Python, MATLAB
Simulation Tools: MuJoCo, Gazebo, Webots, CoppeliaSim
Computer aided design/engineering: SOLIDWORKS
Software Libraries and Tools: ROS/ROS2, quadprog, qpOASES, OpenCV, Git, LaTeX, Docker

Languages

Korean (native)
Chinese (bilingual)
English (fluent)

Others

Military Services | Korea Army, Republic of Korea **Mar. 2015 - Dec. 2016**

- Honorably Discharged.